a device for producing a monocrystal by growing the monocrystal from a melt of raw materials with a heating appliance for generating a temperature gradient within the melt of raw material, wherein the heating appliance comprises a rotationally symmetrical furnace with a rotation axis (M) and with an essentially level floor heater and an essentially level cover heater that can be controlled to different temperatures, the device further comprising:

an insulating device that is structured and arranged in such a way that a heat flow in a radial direction perpendicular to the rotation axis (M) of the furnace can be controlled at a preset rate,

as set forth in claim 14, and

a device for producing a monocrystal by growing the monocrystal from a melt of raw materials with a heating appliance for generating a temperature gradient within the melt of raw material, wherein the heating appliance comprises a rotationally symmetrical furnace with a rotation axis (M) and with an essentially level floor heater and an essentially level cover heater that can be controlled to different temperatures, the device further comprising:

an insulating device that is structured and arranged to provide an insulating effect having a gradient from the cover heater to the floor heater,

as set forth in claim 32.

Claims 14-23, 25-30, 32-36, 38 and 39 are rejected under 35 U.S.C. 103(a) over Althaus et al. ("Some new design features for vertical Bridgman furnaces and the investigation of small angle grain boundaries developed during VB growth of GaAs," ***Journal of Crystal Growth*** 166 (1996) pg 566-571) in view of Scully et al. (US 2,281,718).

Althaus et al. describes a vertical Bridgman furnace for producing a monocrystal from a melt of raw materials. The embodiment illustrated in Fig. 1comprises a floor heater 1 and a cover heater 2 for generating an axial heat flow to providea temperature gradient within the melt of raw materials. The top plate is kept at a temperature somewhat higher than the melting temperature of GaAs while the temperature of the lower plate is reduced in a controlled way. The cylindrical boundary is kept at a temperature very close to the melting temperature of GaAs. As a result, the radial heat flux is always directed inward.

In the embodiment illustrated in Fig. 2, Althaus et al. disclose a Stockbarger type furnace having an upper heat zone where the temperature is greater than the melting temperature of GaAs and a lower zone where the temperature is less than the melting temperature of GaAs. Between the zones and connecting them is a highly anisotropic material having high radial heat conductivity to conduct heat from a radial booster heater.

On the contrary, the device for producing a monocrystal in accord with the present invention comprises **an insulating device** that is structured and arranged in such a way that **a heat flow in a radial direction** perpendicular to the rotation axis (M) of the furnace **can be controlled at a preset rate**, as set forth in claim 14, or **an insulating device** that is structured

and arranged **to provide an insulating effect having a gradient** from the cover heater to the floor heater, as set forth in claim 32.

However, Althaus et al. ***fails*** to teach or suggest an insulation device, as presently claimed.

Scully et al. ***fails*** to make up for the deficiencies of Althaus et al. First of all, Scully teaches a chamber for casting metal ingots. The chamber is designed to cool the cast molten metal to form ingots. An important object of the invention is to form the ingot with a skin that is uniformly strong enough to minimize the tendency of the ingot to hang in the mold. It is not seen how someone of ordinary skill in the art would look to a casting chamber for metal ingots when designing a device for producing a monocrystal. Althaus et al. do not suggest that there is any problem with the tendency of the monocrystal to hang in a mold. Nor do they suggest that it is desirable to form the monocrystal with a skin that is uniformly strong enough to minimize the tendency of the monocrystal to hang in a mold. Thus, it cannot be seen how Althaus et al. and Scully et al. would have been combined by one of ordinary skill in the art.

It is respectfully submitted that it would not have been obvious at the time the present invention was made for a person having ordinary skill in the art to combine the insulation device

of Scully et al, with the vertical Bridgman furnace according to Althaus et al. to solve the object of the invention due to the following reasons:

a) Scully et al is directed to casting molten steel and cooling an ingot where the steel has many contiguous crystals. There is no desire to form a monocrystal. The heat-insulating material around the mold according to Scully et al. is used for controlling the radial temperature gradient. In Althaus Fig. 1, the radial heat flux is always inward. In Scully, the radial heat flux is always outward to form the skin. With respect to Althuas Fig. 2, there is no suggestion at all regarding radial heat flux and it is difficult to how the two zone structure of Althaus and the insulating structure of Scully would have been combined by one of ordinary skill in the art.

b) According to Scully et al, the temperature is controlled by the heat flow in radial direction (cf. p. 1, left col., lines 20 and 21) which is controlled by the body of heat-insulating material. In contrast to that, according to the present invention, the temperature gradient is controlled by the heat flow in axial direction. It is contrary to the object of the present invention to have a heat flow in radial direction.

c) According to Scully et al. it is desirable to form a skin along the entire length of the mold (cf. p. 2, left col., lines 57-65). That means that it is desired to have a temperature gradient in radial direction. In contrast to that, it is an object of the

present invention to minimize the temperature gradient in radial direction. Therefore, it would not have been obvious for a person having ordinary skill to introduce the body of heat-insulating material of Scully et al. into the apparatus according to Althaus et al, to minimize the temperature gradient in radial direction.

All claims dependent from independent claims 14 and 32 are patentable for at least the same reasons as discussed above.

Claims 24, 31 and 37 are rejected under 35 U.S.C. 103(a) over Althaus et al. in view of Scully et al., and further in view of Nestor (US 5,116,456). Althaus and Scully are discussed above. Nestor ***fails*** to make up for the deficiencies of Althaus and Scully. Nestor also fails to teach or suggest **an insulating device** that is structured and arranged in such a way that **a heat flow in a radial direction** perpendicular to the rotation axis (M) of the furnace **can be controlled at a preset rate**, as set forth in claim 14, or **an insulating device** that is structured and arranged **to provide an insulating effect having a gradient** from the cover heater to the floor heater, as set forth in claim 32.

Thus, it is not seen how the present invention would have been obvious to one of ordinary skill in the art from any combination of Althaus, Scully and Nestor.

In view of the discussion above, it is respectfully submitted that the present application is in condition for allowance. An early reconsideration and notice of allowance are earnestly solicited.

Respectfully submitted,

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